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Does undergraduate curriculum design make a difference to readiness to practice as a junior doctor?

Short title: Curriculum design for readiness to practice

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ABSTRACT

Context There is a call for undergraduate medical education curricula in the U.K. to improve design for work-based learning. This may include earlier, structured and sustained clinical experience to afford a smoother transition into working as a junior doctor. Evaluations must be carried out to improve curriculum design.

Objective To compare a graduate cohort from one medical school with a cohort from other medical schools in the same Foundation Year 1 (FY1) programme in terms of perceptions of readiness for practice, as a retrospective judgement having experienced what it is like to work as a junior doctor.

Methods A Likert-scale questionnaire was developed to measure self-perception of readiness to practice. Items included general capabilities and specific clinical skills. Scores were compared across two cohorts.

Results Response rate was 74% (n=146). The Peninsula medical school graduates cohort reported readiness for practice at a significantly higher level than the comparison cohort in 14 out of 58 items (24%), particularly for 'coping with uncertainty.' In only one item (2%) does the comparison cohort report at a significantly higher level.

Conclusions Significant differences between cohorts may be explained by the curriculum as a complex educational intervention – specifically, the opportunity for meaningful, early, structured and sustained experiential learning with patient contact at the core of the experience. Peninsula Medical School offers an innovative curriculum that integrates experiential, work-based learning with reflection in small groups. Evaluation informs continuous quality improvement of the undergraduate curriculum to facilitate the transition from medical student to practising FY1 doctor.

INTRODUCTION

This is a companion paper to Brennan *et al* (2010) 'The transition from medical student to junior doctor: today's experiences of Tomorrow's Doctors.' That paper reported qualitative data articulating the experiences of the 2007 graduate cohort from Peninsula Medical School as they experienced the transition into the Foundation Year 1 (hereafter FY1). This paper focuses upon perceptions of the following year's (2008) cohort of how well their undergraduate education had prepared them for such a transition as this cohort reflected on their undergraduate experience having now experienced their first year of doctoring. Importantly, this study compares such perceptions with those of a similar number of graduates from other medical schools working within the same FY1.

The Peninsula Experience

Peninsula Medical School (hereafter 'Peninsula') has deliberately set out to innovate in undergraduate curriculum development, guided in particular by evidence from contemporary work-based educational thinking (Bleakley, 2006; Bleakley, Bligh & Browne, in press) including activity theory (Engeström, 2008), complexity science (Bleakley, in press) and second wave curriculum reconceptualisation (Pinar, 2004, 2006). Established in 2002 and serving the far South West of England, Peninsula had the advantage of starting with a clean slate, while closely monitored by the General Medical Council for quality. The curriculum, which is constantly being enhanced, explicitly sets out to produce 'tomorrow's doctors,' fit for practice in the 21st century - strong on clinical science but centred on patients (Bleakley & Bligh,

2008). The curriculum places a strong emphasis on early and sustained clinical exposure and *participation*, with meaningful patient contact a product of design of learning opportunities. Learning methods stress focused and structured *activity*, followed by integrative *reflection*, based around patients as persons, not 'cases.' Real clinical experience, involving learning from patients, is then at the heart of the curriculum.

Peninsula places great emphasis upon 'achieving excellence' (Tooke, 2007), moving beyond the merely competent doctor to one with 'added value.' We predicted that our graduates would strive for excellence clinically, be able to integrate this with expertise in communication and team working, demonstrate humane and ethical practice, develop leadership qualities and, importantly, show high tolerance of uncertainty and ambiguity. This is a combination of both preparedness for role and development of identity in which both tolerance of uncertainty and preparedness to collaborate are central characteristics. The curriculum then promises much, but does it deliver - do graduates from that curriculum feel prepared for transition to work as a doctor, a question of confidence as much as competence?

In order to address this question, we piloted a complex multi-methods evaluation with our first cohort of graduates (2007) and from this developed an evaluation model that we then implemented with our second cohort of graduates (2008). This paper reports the first stage and level of the evaluation of the 2008 graduate cohort – graduates' perceptions of how well prepared they were for practice as a doctor, collected as a retrospective account where questionnaires were administered towards the end of their first placement on FY1. Further evaluations will include a longitudinal tracking of this cohort and measures of performance gathered from Foundation assessments.

While medical education in the U.K. strives to achieve a seamless transition between undergraduate, foundation and specialist education and training experiences, evaluation at transition points is still important. Perhaps the key transition is from the undergraduate curriculum to the first year of practice as a doctor and it is important that, through evaluation studies across medical schools, we track successes and challenges in this transition to inform continuous quality improvement of the undergraduate curriculum.

Tomorrow's Doctors 2009 (GMC, 2009), that provides the framework for U.K. undergraduate medicine and surgery curricula, states that 'early and continuing contact with patients' is mandatory for medical students (p.53). However, students' *meaningful contact with* (rather than, simply, *exposure to*) patients has become increasingly compromised through safety concerns, so that clinical and communication skills are now learned mainly in simulated settings with actor patients, presenting challenges for transfer of learning (Bligh & Bleakley, 2006).

Research (Illing *et al,* 2008) commissioned by the U.K. General Medical Council Education Committee guided key recommendations informing the consultation draft for *Tomorrow's Doctors 2009*. Illing *et al* (2008, p.19) suggested that 'undergraduates' preparedness to begin the Foundation programme will be improved by more experiential learning in clinical practice as part of their undergraduate programme.' Three medical schools were studied, each offering differing curriculum emphases. Final year students felt prepared for carrying out basic clinical skills such as history taking and communication, but felt less confident about practical procedures, working with acutely ill patients, prescribing, managing their workload and being on call.

Subsequent interviews revealed a number of key areas of concern, such as difficulties in adapting to hospital procedures and confusion about the role boundaries of FY1 doctors. Further concerns revealed after taking up FY1 posts were: not arriving with sufficient ward experience, difficulties in making clinical judgements and management decisions for the care of acute patients and confidence in prescribing.

Incremental improvement in curriculum design

As the most recent addition to a small, but significant, literature, the Illing *et al* (2008) study results recorded a continuing rise in quality of the undergraduate experience in terms of the preparedness of medical students for the transition to practice as a doctor. An overall, historical incremental improvement in planning, implementing and evaluating the undergraduate curriculum can be traced, with structured, early and sustained learning through experiential contact with patients at its core.

Clack's (1994) study was limited to graduates from King's College, London and conducted to inform new curriculum development. Through postal survey, five cohorts of graduates were asked how well the undergraduate course had equipped them for practice. 371 returns, a 78% response rate, showed that over 70% were satisfied with the knowledge and skills gained on the course, but not so content with the development of personal attributes. Given that nearly a third of graduates did not feel that the course had prepared them well, deficiencies were identified across the undergraduate programme. The King's study should have signalled to all medical schools the importance of curriculum evaluation.

As part of a regular series of surveys on long-term career choices, Goldacre *et al* (2003) conducted a national questionnaire survey (n=3,062, response rate =67%) to ask how well U.K. medical schools had equipped graduates from 1999 and 2000 for their work as Pre-registration house officers (PRHOs). This rested on embedding a single statement in a wider careers survey: 'My experience at medical school prepared me well for the jobs I have undertaken so far.' Responses were invited on a five-point Likert scale from 'strongly agree' to 'strongly disagree.' Only 4% strongly agreed with the statement, while 32% agreed, 22% neither agreed nor disagreed, 30% disagreed and 12% strongly disagreed. There were strong differences between responses by medical schools - ranging from 20% strongly agreeing/ agreeing at one school, to 73% at another. An open, narrative section at the end of the questionnaire typically drew responses such as graduates finding 'not enough emphasis on real life situations,' 'not enough time shadowing PRHO prior to commencing work,' with an overall pattern indicated - of good factual preparation but lack of structured experiential learning.

A replica follow-up study (Cave *et al* 2007) surveyed graduates from 2003 and 2005. A response rate of 65% was gained in 2003, but this dropped to 43% in 2005. The percentage who 'strongly agreed'/ 'agreed' that their undergraduate experience had prepared them well increased from 36% in the original survey to 50% in 2003 and 58% in 2005, with a similar pattern of strong differences between medical schools reported, although all medical schools had been required to update their curricula. U.K. medical schools had thus improved overall in their ability to prepare graduates for the transition to working as a doctor and this improvement may have been due to curriculum enhancement.

Studies conducted by the University of Manchester School of Medicine (Jones, McArdle & O' Neill, 2002; O' Neill *et al*, 2003; Willis *et al*, 2003) and the University of Liverpool Medical School (Watmough, Garden & Taylor, 2006a, 2006b; Watmough, Taylor & Garden, 2006) refined the evaluation agenda through better design - by *comparing* cohorts studying different curricula albeit within the same institutions. New Problem Based Learning (PBL) approaches, involving learning derived from contextualised patient cases rather than abstract knowledge, were shown in both medical schools to better prepare graduates for the transition to PRHO posts than the traditional curricula. PBL approaches offered a greater component of experiential learning although limited to 'paper' cases.

Liverpool introduced their PBL course in 1996. Retrospective views of PRHOs on how well their undergraduate course had prepared them were gained through five focus groups that were audio taped, transcribed and analysed for content (Watmough, Taylor & Garden, 2006a). Overall, the junior doctors surveyed felt that the new undergraduate programme had prepared them well in terms of confidence in adapting to role (professional practice) and in communication, although there were some misgivings about depth of factual knowledge (Watmough, Garden & Taylor, 2006b). Interviews with educational supervisors confirmed these findings (Watmough, Taylor & Garden, 2006).

Manchester introduced a PBL-based course in 1994 with an emphasis upon community-based medical education. PRHOs' retrospective views on how well prepared they were for the transition to their first jobs were gained by postal questionnaire survey, comparing the 1998 (traditional curriculum) and 1999 (new curriculum) graduate cohorts. The questionnaire, blueprinted on *The New Doctor*,

was also sent to a sample of educational supervisors. The findings showed that overall the new curriculum had a beneficial result on preparing graduates for work as a junior doctor, again with an emphasis upon preparation for role (Jones, McArdle & O' Neill, 2002).

Parallel studies attempted to articulate the key qualities developed by the new curriculum through comparing how junior doctors from the old and new curricula dealt with critical incidents. Graduates from the new curriculum were better able to deal with uncertainty, define their limits and assert their rights for support. Although these graduates reported communication and emotional involvement issues (O' Neill *et al*, 2003), they had a sophisticated view of their role as a team member (Willis *et al*, 2003).

A picture emerges from these studies. First, curriculum evaluation is key to shaping undergraduate education in terms of better preparing graduates for their work as a junior doctor. Second, the undergraduate curriculum does make a difference to preparedness for role as a junior doctor. Third, a curriculum that integrates practical clinical experience with content learning shows benefits - in producing junior doctors who are fit for purpose. Fourth, a pattern of capabilities emerges from introducing structured experiential learning in the undergraduate years. While technically capable, graduates show greater confidence in contact with patients, ability to cope with uncertainty and ability to collaborate effectively. These relate particularly to role engagement and identity management, affording precisely the set of values, skills and knowledge that Roter and Hall (2006), in a meta-analysis of studies of communication in medicine, show as still not evident across contemporary clinical

practice. An historical trajectory of improvement of outcomes through modernising the undergraduate medicine curriculum can then be traced. But more remains to be done.

The study of Illing *et al* (2008) suggests that the key issue in preparing medical students for work is provision of meaningful engagement with clinical practice (both expert practitioners and patients) *throughout the career* of the student. This finding supports early and sustained use of 'experiential learning' approaches. However, there are two important questions to be asked on the back of this study. First, what contemporary educational theory and methods will best inform a work-based learning educational strategy (Bleakley, 2006; Bleakley, Bligh & Browne, in press)? Second, what, precisely, is meant by 'experiential learning'? We address these questions in the Discussion section.

METHODS

A questionnaire was utilised to measure relative levels of perceptions of the second cohort of graduates from Peninsula on how well they were prepared for their first clinical roles, two and a half months into their first FY1 placement within the Peninsula Postgraduate Deanery. The questionnaire offers a way to assess confidence in coping with this key transition. Results were compared with a serendipitously matched cohort of graduates from other medical schools on the same FY1 programme, offering an opportunity for evaluation of the curriculum as a complex educational intervention.

We gained permission from the designers of the Manchester study, referred to above, to adopt and adapt their questionnaire measuring perceptions of graduates

for how well their undergraduate study prepared them for their entry into practice as a doctor. Modifications to the Manchester questionnaire reflected changes brought about by the *Modernising Medical Careers Foundation Programme* (Modernising Medical Careers, 2005) reflected in *The New Doctor 2007* (GMC, 2007). Following the Manchester and Liverpool studies, we carried out a *retrospective* questionnaire study, after students had made the transition into their first FY1 jobs as doctors. This differs from the questionnaire component of the study by Illing *et al* (2008) on preparedness for transition, where students reported their perceptions prospectively, on the basis of shadowing FY1 doctors, rather than retrospectively, from *experience* as a junior doctor.

We piloted an evaluation strategy, for design and feasibility, with the first cohort of graduates (2007), refined the strategy and carried out a full evaluation of the second cohort of graduates (2008). 74% of Peninsula graduates gained FY1 posts in the Peninsula Postgraduate Deanery in 2008, matched by an equal number of Foundation trainees who were graduates from other medical schools.

Sample

The sample size was 146 out of 198 possible FY1 participants, giving a response rate of 74%. Of the 146 respondents, 54.2% were Peninsula graduates and 45.8% were graduates from other medical schools offering a basis for comparison.

Questionnaire

The two-part questionnaire is detailed in Tables 1 and 2. The principal researcher attended mandatory FY1 education sessions across three hospital sites to inform potential participants of the study and to invite participation. For those who were not present at the educational sessions, an e-mail was sent asking them to voluntarily complete the questionnaire.

The first section of the questionnaire (Table 1) asks, *'How well did your undergraduate course prepare you for*….?, followed by a list of broad areas of competence as defined in *Tomorrow's Doctors* and by the *MMC Foundation Programme*. The second section (Table 2) focuses on clinical skills and procedures, asking *'How well did your undergraduate course prepare you to carry out the following clinical skills and procedures…?*. Respondents rated their answers on a five-point Likert scale, with 'extremely well prepared' and 'unprepared' as the range, the mid-point label being 'prepared'. At the end of each of the two sections, there was an open question so that respondents could provide narratives about how prepared they felt (data not reported here).

Data Analysis

The data were analysed using SPSS for Windows 16.0. An exact Chi-square test was used to identify any statistically significant differences between graduates from Peninsula and graduates from other medical schools. Statistical significance was set at $p \leq 0.01$, given the number of comparisons being made. While a five-point Likert scale was used in the questionnaire, for the purposes of clarity in data reporting the data were recoded into three groups: above the mid-point on the five point scale

(extremely/well prepared), the mid point (prepared) and below the mid point (not very well prepared/unprepared).

RESULTS

Of the 58 items in the questionnaire, a statistically significant difference between the cohort of Peninsula graduates and the cohort of graduates from other medical schools was found on 15 items. 14 of these were in favour of the Peninsula cohort, where one favoured the cohort of graduates from other schools (Table 3).

The 14 items showing a statistically significant difference in favour of Peninsula graduates were:

Broad capabilities

1. *Coping with uncertainty.*
2. *Breaking bad news to patients and relatives.*
3. *Understanding the purpose and practice of appraisal.*
4. *Undertaking a teaching role.*
5. *Taking part in advanced life support.*
6. *Time management.*
7. *Clinical governance.*

Specific clinical skills

1. *Airway care including simple adjuncts.*

2. *Arterial puncture in an adult.*
3. *Subcutaneous, intradermal, intramuscular & intravenous injections.*
4. *Urethral catheterisation.*
5. *Spirometry and peak flow.*
6. *Nasogastric tube insertion.*
7. *Correctly using a nebuliser.*

The one item showing a statistically significant difference in favour of the cohort of graduates from other medical schools was: *Providing appropriate care for people of different cultures.*

Of the remaining 43 items, nine showed a high level of preparedness (>80%) across the combined cohort (Table 4), including seven general capabilities and two specific clinical skills. More than 20% of graduates across the combined cohort felt unprepared for only eight broad capabilities and specific clinical skills (Table 5). This included 'prescribing safely' and prescribing was also listed several times as being a problem in the open question, for example: *'I think [our medical school] prepared us so well in most aspects however prescribing drugs was probably not well covered.'*

DISCUSSION

Explanation of the findings: a curriculum effect

As junior doctors reflect on their undergraduate curriculum, albeit very early in their career, the educational innovations introduced at Peninsula are seen as beneficial. While preparedness for practising technical medicine safely and capably was reported, Peninsula graduates reported being particularly well prepared for the 'non-technical' or 'value-added' aspects of medicine, such as 'coping with uncertainty,' 'breaking bad news to patients and relatives,' 'understanding the purpose and practice of appraisal,' 'undertaking a teaching role' and 'taking part in advanced life support' (which requires collaborative teamwork).

The findings in no way disparages other medical schools' approaches – indeed, a relatively high level of preparedness for practice is reported across the entire FY1 cohort studied. However, where there is a positive and significant difference in favour of Peninsula graduates, this finding seeks explanation. We suggest a curriculum effect, as a complex educational intervention where the key difference in curriculum approach may be Peninsula's emphasis upon early, structured and sustained experiential clinical learning, focusing upon practical knowing as well as analytic reasoning.

Limitations to the study

There are four key limitations to the study:

1. Measures of perception rather than performance are used, where self-reports are notoriously unreliable (Gordon, 1991; Eva & Regehr 2007) and correlation between levels of confidence and levels of performance is uncertain (Morgan & Cleave-Hogg,

2002). We were aware of such limitations, but wished to progress the associated studies reported above that also used self-reports. We have a rationale for this: that while self-reports are sometimes seen as invalid measures, we suggest that self-reporting is, as Eva & Regehr (2007, p. 581) note, 'reflection in practice' – or, *precisely how junior doctors carry out their daily work*. Self-reporting then has high ecological validity, as a mirror of real work. Paradoxically, many of the studies that decry the validity of self-reporting are carried out with undergraduate Psychology students in laboratory conditions and then show ecological invalidity. Further, as we utilised a comparison design over two cohorts, there is still an effect to be explained – that of a consistent difference between the cohorts. While the stronger self-reports may indicate *confidence* in ability rather than ability itself, we would not see this as a drawback. Confidence is an important quality in successfully managing transition. Again, the spectrum of self-reporting scores may not indicate distorted views but a spectrum of ability for reflection in practice.

2. The study is local and necessarily small scale and this FY1 year may be unique in some way, limiting generalisability.

3. There is a focus upon instrumental and descriptive issues such as lists of skills, rather than role and identity issues such as how a medical student's identity is reconstructed to become a doctor. The latter approach reframes transition as an issue of identity management rather than accumulation of knowledge and skills, following the view that work-based learning is centred not on what one knows but

how one manages identity in terms of legitimate participation in a community of practice (Wenger, 1998).

4. Evaluation outcomes may reflect the admissions policy rather than specific curriculum effects (Pearson *et al*, 2002).

Curriculum enhancements

A striking finding was that Peninsula graduates were particularly well prepared for 'coping with uncertainty' - one of the school's main undergraduate learning outcomes (Knight & Mattick, 2006). The complex of recognising, managing and communicating uncertainty is recognised by medical education academics such as Ludmerer (1999) and Montgomery (2006) and clinicians such as Groopman (2007) as the key issue facing medical education. The curriculum is designed so that students learn how to tolerate ambiguity and manage uncertainty through facilitated exposure to relatively ill-structured situations in 'activity learning' contexts (Engeström, 2008; Bleakley, Bligh & Browne, in press).) involving working with patients and colleagues.

Among learning that affords the 'value added' dimension to the Peninsula curriculum is undertaking teaching roles and engaging with an appraisal model of professionalism. These curriculum enhancements may explain why the Peninsula cohort felt well prepared for these roles in comparison with the graduate cohort from other medical schools.

In one area ('providing appropriate care for people of different cultures') graduates from other medical schools perceive themselves as significantly better than

graduates from Peninsula. This may be explained by the fact that the far South West peninsula population has unusually low ethnic diversity. In contrast, the comparison cohort contains graduates from city-based medical schools where there are opportunities to work across an ethnic mix. FY1 doctors also continue to find prescribing an issue and this is echoed in other studies (Illing *et al*, 2008), indicating an area of national concern for the undergraduate curriculum.

Future research: conceptualising experiential learning

There are several future lines of inquiry that the study suggests. Returning to the Illing *et al* (2008) study and its influence upon *Tomorrow's Doctors 2009*, it is rather naive to simply suggest that 'experiential learning' in the workplace throughout the undergraduate years will necessarily better prepare medical students for the transition to work as junior doctors. We need, first, to better conceptualise 'experiential learning.' There is, for example, a difference between learning *through* experience (reflection-in-action, learning by doing, or enactive learning), learning *from* experience (reflection-on-action, reflexive accounting) and learning *to* experience (tolerance of ambiguity, openness, adaptability and flexibility). It may be that learning *through* and *to* experience - rather than just *from* experience - is what identifies the excellent, rather than the merely competent, practitioner (Bleakley, 1999).

Second, we need to know what constitutes a meaningful work-based placement 'experience.' For example, a study by Paice *et al* (2002) looking at stressful incidents encountered by junior doctors early in their careers concluded that experience of stress was a result of juniors being asked to do too many complex tasks too early

without adequate support. This may be related to developing tolerance of ambiguity and uncertainty. Work-based learning for undergraduates must be structured, sequenced and scaffolded, where the necessarily complex is not allowed to tip into chaos (Bleakley 2010).

In addressing the question 'how well prepared are graduates for their FY1`jobs?,' this should be addressed through programmatic, collaborative evaluations across medical schools. Resources needed to systematically investigate this question are unlikely to be available locally and may only offer insular yield. While trends and patterns can be identified from a historical overview of the – albeit limited – evaluation studies summarised in the Introduction, what is now needed are comparative evaluations across multiple sites. The study by Illing *et al* (2008) has kick-started this process.

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TABLES

Table 1: Graduate ratings of broad competencies *'How well did your undergraduate course prepare you for…?'*

		% responding to item			Well/extremely well prepared			Prepared			Unprepared/not very well prepared		
		'New' (%)	'Other' (%)		'New' (%)	'Other' (%)		'New' (%)	Other' (%)		'New' (%)	'Other' (%)	P-value
Q1	Taking a history	100	100		96	91		4	9		0	0	0.302
Q2	Examining patients	100	100		89	91		11	8		0	2	0.404
Q3	Skills of close observation	90	93		61	57		34	32		6	11	0.55
Q4	Clinical reasoning & making a diagnosis	100	100		63	51		37	40		0	9	0.013
Q5	Selecting appropriate investigations & interpreting the results	99	100		50	52		45	45		5	3	0.877
Q6	Prescribing safely	100	100		22	28		44	43		34	28	0.597
Q7	Keeping an accurate & relevant medical record	99	100		54	48		41	39		5	13	0.244
Q8	Early management of emergency patients	100	100		61	46		35	36		4	18	0.014
Q9	Taking part in advanced life support	96	100		67	45		32	34		1	21	**<0.001**
Q10	Functioning safely in an acute 'take' team	96	100		40	27		42	49		18	24	0.285
Q11	Planning discharge for patients	100	100		22	16		41	45		38	39	0.746
Q12	Being aware of their limitations	100	100		80	70		20	28		0	2	0.208
Q13	Time management	99	99		62	41		33	38		5	21	**0.005**
Q14	Organisational decision making	99	100		46	39		47	45		6	16	0.156
Q15	Maintaining good quality care	100	100		58	46		41	54		1	0	0.135
Q16	Ensuring & promoting patient safety	100	99		53	49		44	39		3	12	0.09
Q17	Reporting & dealing with error & safety	100	100		20	22		49	40		30	37	0.559

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	incidents												
Q18	Reducing the risk of cross-infection	99	99		67	62		31	33		3	5	0.741
Q19	Basic nutritional care	100	100		13	18		43	43		44	39	0.658
Q20	Clinical governance	99	100		27	19		60	45		13	36	**0.005**
Q21	Recognising the social & emotional factors in illness & treatment	100	100		82	79		18	18		0	3	0.458
Q22	Educating patients (health promotion & public health)	100	100		65	64		30	28		5	8	0.888
Q23	Understanding the relationship between primary/social care & hospital care	100	100		52	54		44	42		4	5	0.958
Q24	Coping with ethical & legal issues (such as confidentiality & consent)	100	100		68	73		30	25		1	2	0.79
Q25	Engaging in self-directed lifelong learning	100	100		79	69		18	27		4	5	0.434
Q26	Understanding the purpose & practice of appraisal	100	100		73	54		25	36		1	10	**0.01**
Q27	Using evidence & guidelines for patient care	99	100		55	66		44	27		1	8	**0.032**
Q28	Using audit to improve patient care	99	100		44	48		44	31		13	21	0.234
Q29	Undertaking a teaching role	100	100		72	46		24	33		4	21	**0.001**
Q30	Communicating effectively & sensitively with patients & relatives	100	99		86	77		13	21		1	2	0.303
Q31	Breaking bad news to patients & relatives	100	100		79	61		19	22		3	16	**0.007**
Q32	Providing appropriate care for people of different cultures	100	100		33	60		42	30		25	10	**0.003**
Q33	Communicating effectively with colleagues	100	100		76	78		24	21		0	2	0.686

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Q34	Working effectively in a team	100	100		79	73		22	25		0	2	0.492
Q35	Coping with uncertainty	100	99		89	42		10	41		1	17	**<0.001**
Q36	Using informatics as a tool in medical practice	99	99		51	36		36	39		13	24	0.12
Q37	Acting in a professional manner (with honesty & probity)	99	100		86	73		14	27		0	0	0.063
Q38	Managing their health, including stress	99	97		55	49		37	34		8	17	0.255
Q39	Overall patient-centred practice & humane care	99	100		81	69		19	28		0	3	0.083

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Table 2: Graduate ratings of specific skills. *'How well did your undergraduate course prepare you to carry out…?'*

		% responding to item			Well/extremely well prepared			Prepared			Unprepared/not very well prepared		
		'New' (%)	'Other' (%)		'New' (%)	'Other' (%)		'New' (%)	Other' (%)		'New' (%)	'Other' (%)	P-value
Q41	Venepuncture & IV cannulation	95	93		89	79		11	15		0	7	0.047
Q42	Basic CPR	95	93		85	77		15	23		0	0	0.27
Q43	Administering local anaesthetics	95	93		31	21		45	45		24	34	0.297
Q44	Arterial puncture in an adult	95	93		72	50		28	37		0	13	**0.001**
Q45	Blood cultures from peripheral & central sites	95	93		55	50		31	39		15	11	0.602
Q46	Subcutaneous, intradermal, intramuscular & intravenous injections	95	93		60	29		36	39		4	32	**<0.001**
Q47	IV medications	94	93		38	24		49	44		14	32	0.024
Q48	Intravenous infusions, including the prescription of fluids, blood & blood products	95	93		37	34		45	39		17	27	0.38
Q49	Performing an ECG	95	93		59	53		31	31		11	16	0.651
Q50	Spirometry & peak flow	94	93		55	40		41	36		4	24	**0.002**
Q51	Urethral catheterisation	95	93		57	40		40	39		3	21	**0.002**
Q52	Airway care, including simple adjuncts	95	93		77	52		23	45		0	3	**0.002**
Q53	Nasogastric tube insertion	94	93		50	19		45	45		5	36	**<0.001**
Q54	Writing a prescription	95	93		53	45		41	39		5	16	0.121
Q55	Calculating accurate drug dosages	95	93		37	37		52	45		11	18	0.485
Q56	Correctly using a nebuliser	95	91		48	26		41	28		11	46	**<0.001**
Q57	Suturing	95	93		31	37		44	37		25	26	0.674

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Q58	Obtaining valid consent	95	93		60	45		27	40		13	15	0.178
Q59	Control of haemorrhage	95	91		27	36		53	43		20	21	0.415

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Table 3: Ratings of broad competencies and specific skills that were statistically significant: *'How well did your undergraduate course prepare you for…?'*

	Well/extremely well prepared			Prepared			Unprepared/not very well prepared		
Medical School	**'New' (%)**	**'Other' (%)**		**'New' (%)**	**'Other' (%)**		**'New' (%)**	**'Other' (%)**	**P-value**
Coping with uncertainty	89	42		10	41		1	17	**<0.001**
Taking part in advanced life support	67	45		32	34		1	21	**<0.001**
Subcutaneous, intradermal, intramuscular & intravenous injections	60	29		36	39		4	32	**<0.001**
Nasogastric tube insertion	50	19		45	45		5	36	**<0.001**
Correctly using a nebuliser	48	26		41	28		11	46	**<0.001**
Undertaking a teaching role	72	46		24	33		4	21	**0.001**
Arterial puncture in an adult	72	50		28	37		0	13	**0.001**
Airway care, including simple adjuncts	77	52		23	45		0	3	**0.002**
Urethral catheterisation	57	40		40	39		3	21	**0.002**
Spirometry & peak flow	55	40		41	36		4	24	**0.002**
Providing appropriate care for people of different cultures	33	60		42	30		25	10	**0.003**
Time management	62	41		33	38		5	21	**0.005**
Clinical governance	27	19		60	45		13	36	**0.005**
Breaking bad news to patients & relatives	79	61		19	22		3	16	**0.007**
Understanding the purpose & practice of appraisal	73	54		25	36		1	10	**0.010**

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Table 4: Ratings of broad competencies and specific skills that >80% of graduates felt well/extremely well prepared for. *'How well did your undergraduate course prepare you to.…?'*

	Well/extremely well prepared			**Prepared**			**Unprepared/not very well prepared**		
	'New' (%)	**'Other' (%)**		**'New' (%)**	**'Other' (%)**		**'New' (%)**	**'Other' (%)**	**P-value**
Taking a history	96	91		4	9		0	0	0.302
Examining patients	89	91		11	8		0	2	0.404
Communicating effectively & sensitively with patients & relatives	86	77		13	21		1	2	0.303
Acting in a professional manner (with honesty & probity)	86	73		14	27		0	0	0.063
Recognising the social & emotional factors in illness & treatment	82	79		18	18		0	3	0.458
Overall patient-centred practice & humane care	81	69		19	28		0	3	0.083
Being aware of their limitations	80	70		20	28		0	2	0.208
Venepuncture & IV cannulation	89	79		11	15		0	7	0.047
Basic CPR	85	77		15	23		0	0	0.270

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Table 5: Ratings of broad competencies and specific skills that >20% of graduates felt unprepared/not very well prepared for. *'How well did your undergraduate course prepare you to….?'*

	% responding to item			Well/extremely well prepared			Prepared			Unprepared/not very well prepared		
	'New' (%)	'Other' (%)		'New' (%)	'Other' (%)		'New' (%)	'Other' (%)		'New' (%)	'Other' (%)	P-value
Basic nutritional care	100	100		13	18		43	43		44	39	0.658
Planning discharge for patients	100	100		22	16		41	45		38	39	0.746
Prescribing safely	100	100		22	28		44	43		34	28	0.597
Reporting & dealing with error & safety incidents	100	100		20	22		49	40		30	37	0.559
Suturing	95	93		31	37		44	37		25	26	0.674
Administering local anaesthetics	95	93		31	21		45	45		24	34	0.297
Control of haemorrhage	95	91		27	36		53	43		20	21	0.415
IV medications	94	93		38	24		49	44		14	32	0.024

Practice Points

- Undergraduate medicine and surgery curricula should be evaluated to inform curriculum development.
- Evaluations can build on previous studies to establish a progressive evidence base.
- Perceptions of 'preparedness to practice' for FY1, taken retrospectively, can indicate the power of a curriculum to prepare junior doctors for clinical work.
- Tolerance of uncertainty is a key attribute in managing the transition from medical student to Foundation doctor.

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Nicola Brennan is ….